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CASE STUDY

AYURVEDA THERAPY FOR THALASSEMIA MAJOR (BEEJADUSHTIJANYAPANDU) AS AN ADJUVANT – A CASE STUDY

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ABSTRACT

Thalassemia is a genetically passed down blood disorder in which body makes an abnormal form of haemoglobin that leads to anaemia, several organ failure due to iron overload and even death. Disease similar to Thalassemia is not described in Ayurveda, but on the bases of conceptual understanding through Ayurveda concepts it concludes that Thalassemia may be correlated with Beejadoshjanya, Adibalapravruta and Sahaja Vyadhi and nomenclature was coined as Beejadushtijanya Pandu. It can be understood that Pittapradhana Tridosha affects the functions of Raktadhatu. Some of main effective drugs like Devdaru, Agatsya, Kumari, Rohitaka, Agnimantha which was also given in Ayurveda taxies were added in Musta Triphaladi avaleha. Other medicine Gandhakadi Yoga is suggested for Lohasevanajanya vikaraprashamana (iron overloading management). Present study is a Case study on 7 year old male child who have been diagnosed Thalassemia major. His complaint was that severe anemia he is on regular blood transfusion every 20-20 days, liver and spleen enlarged and the serum iron and serum ferritin values were above normal limits according to investigation. At the end of three months of Ayurveda therapy as adjuvant, his blood report and the symptoms of the disease showed very promising results.

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INTRODUCTION

According to the World Health Organization (WHO) Thalassemia is a genetically passed down blood disorder disease in which body makes an abnormal form of haemoglobin due to defects in the globin chain.[i] This causes early excessive destruction of red blood cells leading to hypochromic, microcytic anemia, the characteristic presenting symptom of thalassemia. It can be classified into 3 types, such as Thalassemia Major (TM), Thalassemia Intermedia (TI) and Thalassemia minor (Tm) or traits. The main stay of managing these disease is repeated blood ransfusion. Chronic red cell transfusion therapy leads to progressive iron accumulation in the body. It can be reduce by iron chelation therapy, but iron chelators are coastly and have side effect like growth retardation,visual and auditory toxicity, cataract etc. Due to those complications and incompleteness of modern medical management, there is a need of some adjuvant therapy like Ayurveda, and it should be applied simultaneously with the blood transfusion Which help to increase the blood transfusion interval, to enhance the quality of life and life span of the Thalassemic patients, and to minimize the complications. In adults HbA which is 90% of the total, and HbA_2 which accounts for 2–3%. In fetal the main hemoglobin life is HbF, which are found in normal adult very trace. Total three embryonic hemoglobins, All these deferent hemoglobins are tetramers of two pairs of globins chains[ii]. Ayurveda texts do not describe any disease similar like to Thalassemia but on the bases of conceptual understanding through Ayurveda concepts it concludes that Thalassemia may be correlated with *Beejadoshjanya, Adibalapravruta* and *Sahaja Vyadhi* and nomenclature was coined as *Beejadushtijanya Pandu.*. It is a *Pitta pradhana tridoshaja* disease*,* Due to *Sahaja karana* the process of formation of *Raktadhatu* is affected, which leads to affecting on the functions of *Raktavahasrotasa* and results in *Raktavikriti.* Ayurveda treatment is good therapeutic effects with cost effective, *Musta triphaladiavaleha* were used in treatment of thalassemia major with good results. Five main effective drugs like *Devdaru*, *Agatsya*, *Kumari*, *Rohitaka*, *Agnimantha* were added In Modified *Musa triphaladi avaleha*, which was also given in Ayurveda science. In *Rasashastra,* a subject deals with metals and mineral preparations in Ayurveda, the preparations of *Loha* (iron), the toxic effects of it, when used in excess, i.e. in terms of dose and duration or in wrong way, are also mentioned. *Ayurveda Prakasha*[iii],written by Acharya Madhav, specialy for toxic effects of iron are

mentioned, one such medication suggested as *Lohasevanajanya vikaraprashamana* (i.e. clearing the toxic effects of iron, which may be equated to or appears similar to iron overloading) is modified in to *Gandhakadi Yoga,* the adjuvant drug used in this case study. Present article is about one case study of a seven year old male child, suffering with Thalassemia major diagnosed at the age of 5 month. He was on regular blood transfusion every 20-20 days and had severe anemia, chronic fatigue, liver and spleen slightly enlarged with serum iron and serum ferritin values above normal limits. Other complaints were puffiness of eye, loss of appetite, and loose motion. Both father and mother were carriers of Thalassemia, i.e., Thalassemia minors. The child was on regular blood transfusion with interval of 20-20 days along with modern medical management Deferasirox (550mg). He was administered with Modified *Musta Triphaladi Avaleha and Gandhakadi Yoga* Tablets, the Ayurveda management for three months as adjuvant therapy.

MATERIALS AND METHODS

Modified *Musta-triphaladi Avaleha* is a compound of herbal drug which is frequently mentioned in samhitas in *pandu-kamala chikitsa,* which prepared in dosage format of Avaleha (i.e. lincture) and *Gandhakadi Yoga* is a modified form of the drug suggested for *Lohasevanajanya vikaraprashamana*(iron overloading) in *Ayurveda Prakasha*[iv], Both has been tried clinically as an adjuvant with proven results. The contents and brief details of manufacturing and posology are given below:

Method of Preparation of The Modified *Musta- Triphaladi Avaleha* Drug Avaleha: Method of preparation was adopted as standard procedure from *Sharangdhara Samhita Madhyama Khanda*[v]. Method of Preparation of The *Gandhakadi yoga* Tablet: Method of preparation was adopted as standard procedure as given in Samhitas. The purified *Gandhaka* and dry powder of *Vidanga* fruits were triturated in the leaf juice of *Agastya*, and then converted into tablet form, each tablet weighing 500 mg. Both The Finished product of test drug was used for the pharmacognostical and physico-chemical Parameters study at the Pharmacognosy laboratory and the Pharmaceutical chemistry laboratory.

Posology: The Modified *Musta- Triphaladi Avaleha* and *Gandhakadi Yoga* were administered along with the modern medical management as an adjuvant drug, in divided doses for 12weeks; *Ushnodaka* (warm water) was used as vehicle of administration. Dose of Modified *Musta- Triphaladi Avaleha* 19 mg per day and Dose of *Gandhakadi Yoga* ≈ 375 mg as per day (dose calculated following Young's Formula)[vi]

OBSERVATIONS AND RESULTS

The child had been administered with Modified *Musta-Triphaladi Avaleha* and *Gandhakadi yoga* tablets along with modern medical management for three month duration. It is observed that the BT interval was increased by 9 to 10 days during the treatment period. Improvement in CBC parameter shows in the table no.3 and Table no. 4 shows the changes in biochemical parameters before and after treatment.

Table 1. Ingredients of Modified *Musta-Triphaladi Avaleha*

No.	Drug Name	Botenical Name	Part Used	Quantity
1	*Musta*	*Cyprus rotundus* Nust.	Dry Rhizome	1 part
2	*Amalaki*	*Emblica officinalis* Gaertn.	Dry Fruit	1 part
3	*Haritaki*	*Terminalia chebula*Retz.	Dry Fruit	1 part
4	*Vibhitaki*	*Terminalia bellerica*Roxb.	Dry Fruit	1 part
5	*Katuki*	*Picrorhizakurroa*Royle ex Benth.	Dry Root	1 part
6	*Kakamachi*	*Solanum nigrum* Linn.	Dry Whole plant	1 part
7	*Kutaja*	*Holarrhenaantidysenterica* Wall.	Dry Bark	1 part
8	*Haridra*	*Curcuma longa* Linn.	Dry Rhizome	1 part
9	*Vidanga*	*Embeliarobusta* Burm	Dry Fruit	1 part
10	*Guduchi*	*Tinosporacordifolia* Willd.	Dry Stem	1 part
11	*ShwetaPunarnava*	*Trianthemaportulacastrum* Linn.	Dry Root	1 part
12	*Sharapunkha*	*Tephrosiapurpurea* Linn.	Dry Root	1 part
13	*Apamarg*	*Achyranthusaspera* Linn.	Dry Whole plant	1 part
14	*Kadali*	*Musa paradisiacal* Linn.	Dry Rhizome powder	1 part
15	*Shatavari*	*Aspergusrecemosus* Willd.	Dry Root	1 part
16	*Shigru*	*MoringaOleifera* Lam.	Dry Root bark	1 part
17	*Vasa*	*Adhatodavasica* Nees.	Dry Leaves	1 part
18	*Daruharidra*	*Berberisaristata* DC	Dry Root	1 part
19	*Sariva*	*Hemidesmusindicus* R.Br.	Dry Root	1 part
20	*Manjishtha*	*RubiaCordifolia* Linn.	Dry Root	1 part
21	*Agnimantha**	*Clerodendrumphlomidis* Linn.	Dry Root	1 part
22	*Rohitaka**	*Tecomella undulate* seem.	Dry Bark	1 park
23	*Agatsya**	*Sesbania grandifolia* linn.	Leaves	1 part
24	*Kumari**	Aloe barbadensis Mill.	Leaves	1 part
25	*Devadar**	CedrusdeodaraRoxb.	Dry Root	1 part
26	*Madhu*	-----	-----	q.s
27	*Sharkara*	*Saccharum officinarum* Linn.	Crystal	q.s
28	*Chaturjata*			*Praksepa*
a.	*Twak*	*Cinnamomum zeylanicum* Blume.	Dry Bark	q.s
b.	*Ela*	*Elettaria cardamomum* Maton.	Dry Seed	q.s
c.	*Tamalapatra*	*Cinnamomum tamala* Nees.& Eberm.	Dry Leaf	q.s
d.	*Nagakesara*	*Mesua ferrea* Linn	Dry Pushpakalika	q.s
29	*Trikatu*			*Praksepa*
a.	*Shunthi*	*Zingiber officinale* Rosc.	Dry Rhizome	q.s.
b.	*Maricha*	*Piper nigrum* Linn.	Dry Fruit	q.s.
c.	*Pippali*	*Piper longum* Linn.	Dry Fruit	q.s.

Table 2. Ingredients of *Gandhakadi Yoga*

Sr.No.	Drug Name	English / Latin	Part used	Quantity
1.	*Shuddha Gandhaka*	Sulphur(purified)	As Whole	1 Part
2.	*Vidanga*	*Embelia robusta* Taxonomist	Dry fruit powder	1 Part
3.	*Agatsya*	*Sesbenia Grandiflora* Linn.	Green Leaves	Q.S. for *Bhavana*

Table 3. CBC investigation

Lab. Investigation			
	B.T	A.T.	
Hb	10.3	11	Gm%
Total RBC	3.62	3.04	mil/cumm
Total WBC	16,900	16,700	/cumm
PCV	29.8	25	%
MCV	82.3	82.2	-
MCH	28.5	27.6	-
MCHC	34.6	33.6	-

Table 4. Biochemistry investigation

Lab. Investigation			
	B.T	A.T.	
S. Tot. Protein	5.9	6.2	gm/dl
S. Albumin	3.8	3.5	gm/dl
S. Globulin	2.1	2.7	gm/dl
A/ G Ratio	1.8	1.2	
S. G. O. T.	54	44	iu/l
S. G. P. T.	71	47	iu/l
S. Alkaline Phosphatase	257	183	iu/l
S. Bilirubin T	0.7	0.6	mg/dl
S. Bilirubin D	0.3	0.2	mg/dl
S.Creatinine	0.3	0.7	mg/dl
S. Iron	187	96	µg/dl
S. TIBC	229	283	mcg/dl
S. Ferritin	2880	2176	ng/ml

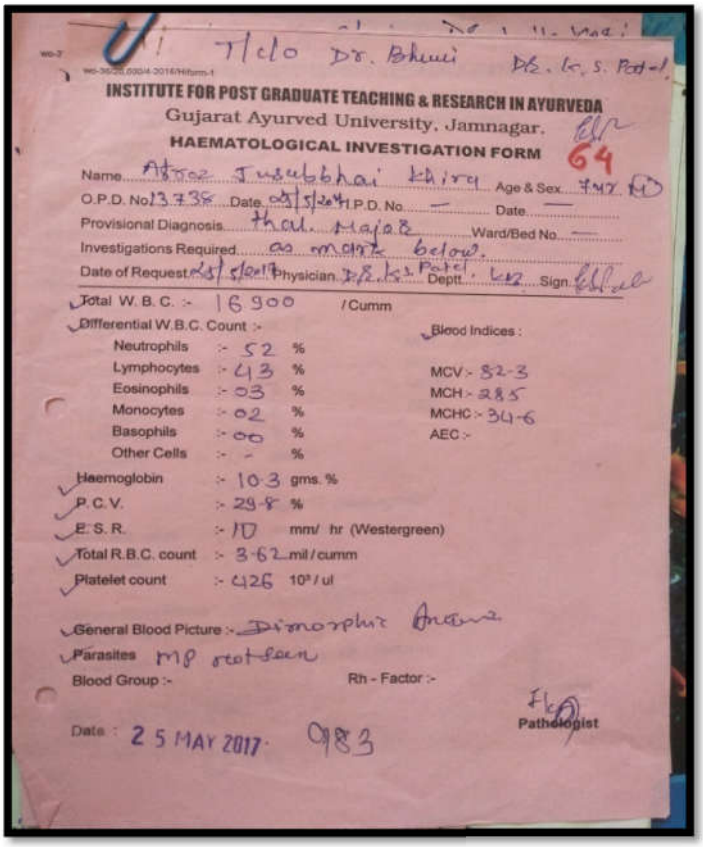


Figure 1. Before treatment

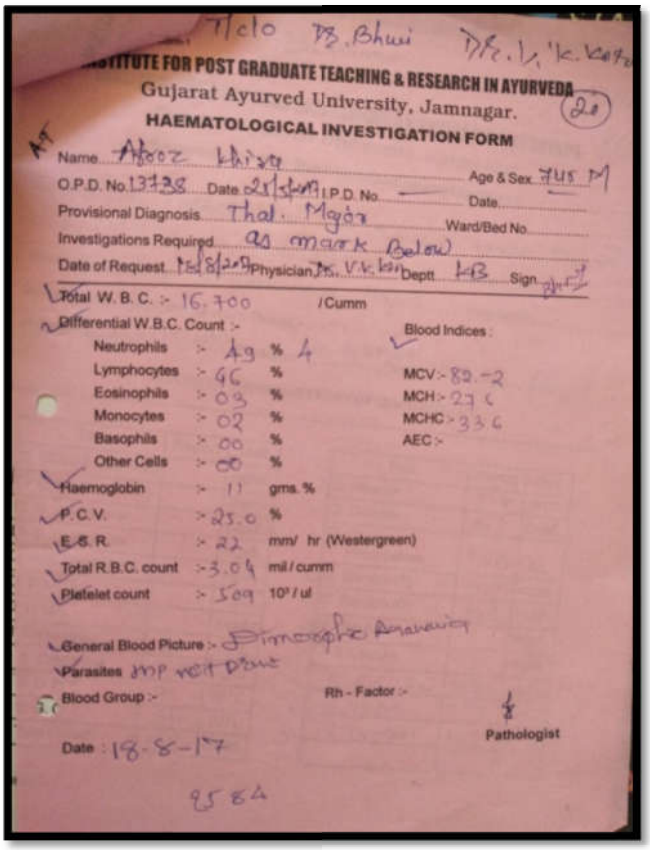
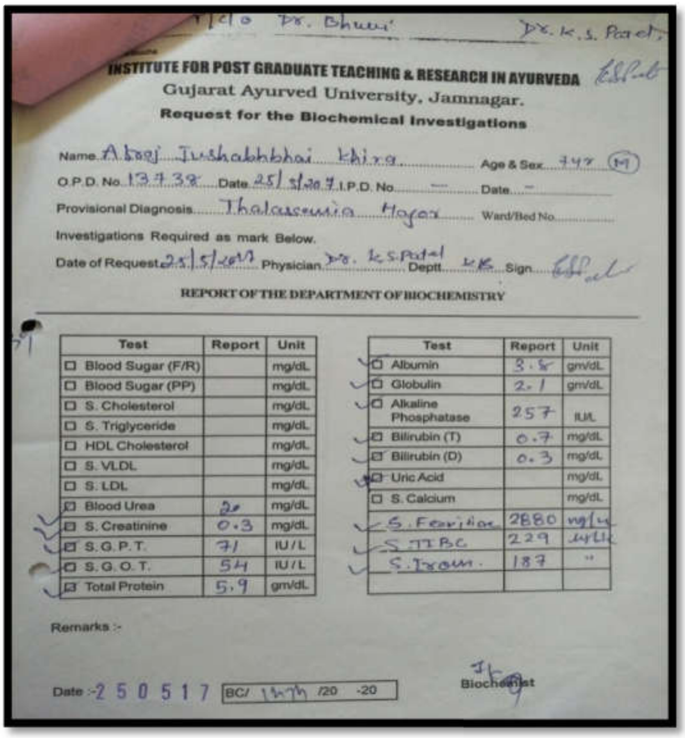


Figure 2. After Treatment



INSTITUTE FOR POST GRADUATE TEACHING & RESEARCH IN AYURVEDA
Gujarat Ayurved University, Jamnagar.
Request for the Biochemical Investigations

Name: Abroj Jushabhbhai Khira Age & Sex: 7 yr (M)
O.P.D. No. 13738 Date 25/5/2017 I.P.D. No. — Date —
Provisional Diagnosis: Thalassemia Major Ward/Bed No.
Investigations Required as mark Below.
Date of Request 25/5/2017 Physician Dr. K.S. Patel Deptt. KB Sign

REPORT OF THE DEPARTMENT OF BIOCHEMISTRY

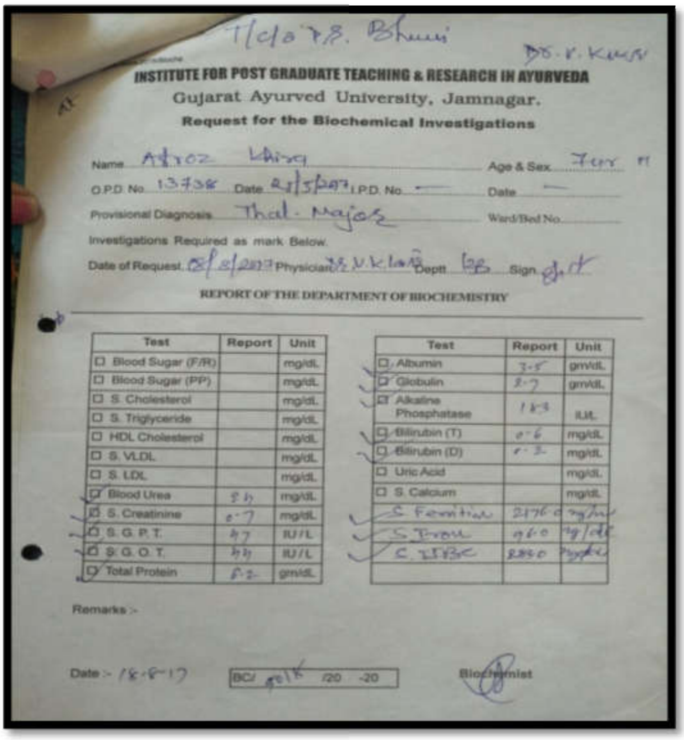
Test	Report	Unit
Blood Sugar (F/R)		mg/dL
Blood Sugar (PP)		mg/dL
S. Cholesterol		mg/dL
S. Triglyceride		mg/dL
HDL Cholesterol		mg/dL
S. VLDL		mg/dL
S. LDL		mg/dL
Blood Urea	20	mg/dL
S. Creatinine	0.3	mg/dL
S.G.P.T.	71	IU/L
S.G.O.T.	54	IU/L
Total Protein	5.9	gm/dL

Test	Report	Unit
Albumin	3.8	gm/dL
Globulin	2.1	gm/dL
Alkaline Phosphatase	257	IU/L
Bilirubin (T)	0.7	mg/dL
Bilirubin (D)	0.3	mg/dL
Uric Acid		mg/dL
S. Calcium		mg/dL
S. Ferritin	2880	[illegible]
S. TIBC	229	[illegible]
S. Iron	187	"

Remarks :-

Date :- 250517 BC/ [illegible] /20 -20 Biochemist

Figure 3. Before treatment



INSTITUTE FOR POST GRADUATE TEACHING & RESEARCH IN AYURVEDA
Gujarat Ayurved University, Jamnagar.
Request for the Biochemical Investigations

Name: Afroz Khira Age & Sex: 7 yr M
O.P.D. No. 13738 Date 21/5/2017 I.P.D. No. — Date —
Provisional Diagnosis: Thal. Major Ward/Bed No.
Investigations Required as mark Below.
Date of Request 08/8/2017 Physician Dr. V.K. [illegible] Deptt. KB Sign

REPORT OF THE DEPARTMENT OF BIOCHEMISTRY

Test	Report	Unit
Blood Sugar (F/R)		mg/dL
Blood Sugar (PP)		mg/dL
S. Cholesterol		mg/dL
S. Triglyceride		mg/dL
HDL Cholesterol		mg/dL
S. VLDL		mg/dL
S. LDL		mg/dL
Blood Urea	[illegible]	mg/dL
S. Creatinine	0.7	mg/dL
S.G.P.T.	47	IU/L
S.G.O.T.	44	IU/L
Total Protein	[illegible]	gm/dL

Test	Report	Unit
Albumin	3.5	gm/dL
Globulin	2.7	gm/dL
Alkaline Phosphatase	[illegible]	IU/L
Bilirubin (T)	0.6	mg/dL
Bilirubin (D)	0.2	mg/dL
Uric Acid		mg/dL
S. Calcium		mg/dL
S. Ferritin	2176.0	[illegible]
S. Iron	[illegible]	[illegible]
S. TIBC	[illegible]	[illegible]

Remarks :-

Date :- 18-8-17 BC/ [illegible] /20 -20 Biochemist

Figure 4. After Treatment

The results showed that decrease in serum ferritin and serum iron too and increase TIBC level after the three months of treatment period. Liver function test like SGOT and SGPT also comes under normal range. Figures 1 to 4 are showing the original reports of the investigations.

DISCUSSION

Blood Transfusion (BT), the only available management in predictable medicine, an attempt should be made to maintain Hb level between 10-12 g/dl to ensure an active life[vii]. The BT interval which was increased during the treatment period, This indicates the reduced rate of destruction of RBC's and breakdown of haemoglobin, and that patient got more benefit by administering this Ayurvedic medicine as an adjuvant and supportive therapy with the existing management. *Raktashodhana, Raktaprasadana, Shonitasthapana, Varnya*and *Pandughna, yakritpleehaghna* properties of the drug may be responsible for the increase in the BT interval. Modified *Musta-triphaladi Avaleha* and *Gandhakadi Yoga* tablets such combination that showed improvement in almost all the cardinal features as well as in the laboratory parameters. No any adverse drug reactions were noted during the study period. Due to RBC's destruction iron overload occur it has resulted in growth failure, hypogonadism, and hepatic disease. It damages the liver, heart, and other parts of the body too. In Ayurveda Prakasha *Agasyapatra swarasa bhavita Vidanga churna* has been mentioned in context to *apakvaloha sevanajanya vikaraPrashamana* (symptoms produced after intake of improperly prepared *lohabhasma* as well as improper digestion of *lohabhasma* (iron overload).[viii]The extract of *Amalaki* and ascorbic acid could prevent the toxic effects of iron[ix]. These both drugs may have chelating effect on iron in that way their consumption helps to regulate the metabolism of iron and avoid its excess accumulation, thus showing a decrease in S.Iron, S. Ferritin level and increases S. TIBC. *Gandhaka* is used as *Lohamaranadravya* and included in *Lohamaranagana*[x].

Marana is process by which *Dhatu* (metal) are altered into absorbable, assimiable and adaptable form[xi].*Sarpunkha*[xii],*Kumari*[xiii], *Rohitaka*[xiv]is proven as *Yakritpleehaghna* Propertie. Alcoholic extract of *Katuki*, Kakmachi showed regression of SGOT, SGPT and alkaline phosphatase levels are noticed (Pandey andChaturvedi, 1969)[xvxvi]. In a Thalassemic patient excess free iron is boundless to ferritin, a specific protein enzyme and thus acts as free radical. This ionized iron causes tissue damage. Thus, *Rasayana* property of *Triphala, Guduchi, Kakmachi, Shatavari, Pippali* can maintain the free radical damage to a certain extent. Other ingredients like *Vidanga* and *Agastyapatra.Vidanga* contains embelin. Free radical scavenging reactions and antioxidant activity of embelin has been reported. Embelin is found to form complexes with nearly all metals under suitable pH giving rise to cheated structures. Embelin also showed iron chelating activity in some of the *Loha* preparations like *Vidangadilauha*, *Saptamritalauha*[xvii]etc. *Agastya* was used as *Bhavanadravya*. Leaves of *Sesbaniagrandi flora* Linn shows Anxiolytic and anti-convulsive activity in experimental animals has been proved[xviii].Evaluation of *Sesbaniagrandi flora* Linn for antiurolithiatic and antioxidant proper-ties showed enthusiastic results[xix]. *Sesbania* leaf is reported to contain Ca (517 mg Ca in 100g leaf protein concentrate-LPC).[xx]Calcium antagonizes iron and is proven for its chelation. In short, *Raktashodhana*, *Shonitasthapana Krimighna, Raktaprasadana, Rasayan* properties protects against the rapid destruction of RBCs and thus prolonging the Life span of RBCs which increases the BT interval. *Aamapachana*, *Deepana*, *Pandughna, Jwaraghna, Vishagna,* and *Rasayana* properties relieve the signs and symptoms of Thalassemia Major. *Lohamarana*, *Lohasevanajanya vikaraprashamana* properties of the drug leads Iron chelation. *Raktashodhana*, *Shonitasthapana, Krimighna, Raktaprasadana, Rasayan* properties protects against the rapid destruction of RBCs and thus prolonging the Life span of RBCs which increases the BT interval. Thus, Modified *Musta Triphaladi Avaleha* and *Gandhakadi Yoga*

helps to decrease iron overload from body, prolong RBCs lifespan, normalize iron metabolism, increase BT interval. Relieve signs and symptoms of the disease. All these factors increase quality of life as well asexpectancy of good life of Thalassemic patients. There was no any ad-verse effect was reported by any of the patients during the course of study.

Conclusion

This treatment protocol has been found Promising result in a single case of Thalassemia Major child along with the modern medical management. The medicine used for the study was found effective to enhance the quality of life and life span of the child and increase blood transfusion interval too. The effect of the treatment protocol should be evaluated on larger scale of the Thalassemic patients.

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